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### SECTION III—REMARKS

This Amendment is submitted in response to the Office Action mailed November 25, 2003, which action the Examiner made final. In this amendment, claims 17-38 are cancelled and new claims 39-47 are added. Claims 39-47 remain pending in the application. Applicants respectfully request allowance of all pending claims in view of the above amendments and the following remarks.

#### New Matter Objections

The Examiner objected to claim 21 because, according to the Examiner, it introduces new matter into the disclosure. Specifically, the Examiner alleges that claim 21 recites an "active device" that dynamically re-programs each sub-grating, and that the specification fails to teach such an active device.

The Examiner's objection is rendered moot by the cancellation of claim 21. As to new claim 42, however, Applicants traverse the Examiner's objection. Applicants respectfully direct the Examiner's attention to the specification at page 11, lines 10-14, where "active devices" are specifically mentioned. In addition to being described in the specification, originally-filed claim 9 recites active devices. The claims as filed in the original specification are part of the disclosure. MPEP §§ 608.04, 2163.06(III), and therefore the mention of active devices in claim 9 constitutes an additional disclosure of an "active device." Since "active devices" are taught in the specification and the originally-filed claims, Applicants respectfully submit that no new matter has been added and request withdrawal of the objection.

#### Rejections Under 35 U.S.C. § 112

The Examiner rejected claims 18 and 21 under 35 U.S.C. § 112, first paragraph. Each claim was rejected on different grounds. In claim 18, the Examiner alleges that the claim fails to comply with the enablement requirement because it contains subject matter not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. Specifically, the Examiner alleges that the specification and the claims fail to teach how both amplitude and phase parameters (*i.e.*, more than two variables) can be determined by a single function, since this is mathematically impossible.

The Examiner's rejection is rendered moot by the cancellation of claim 18. As to new claim 39, however, Applicants respectfully traverse the Examiner's rejection. Applicants respectfully direct the Examiner's attention to the specification at page 13, line 15 to page 15, line 4, which explains how amplitude and phase parameters can be determined. Applicants respectfully submit that this overcomes the Examiner's rejection and respectfully request withdrawal of the rejection.

In claim 21, the Examiner alleges the claim fails to comply with the written description requirement because it contains subject matter not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicants submit that the Examiner's rejection is rendered moot by the cancellation of claim 21. As to new claim 42, however, Applicants respectfully traverse the Examiner's rejection. The Examiner has the burden of presenting by a preponderance of the evidence why a person skilled in the art would not recognize in the Applicants' disclosure a description of the invention defined by the claims. MPEP § 2163.04. The Examiner must set forth express findings of fact that support the conclusion that the claims lack written description. These findings should (A) identify the claim limitation at issue and (B) establish a prima facie case by providing reasons why a person skilled in the art at the time the application was filed would not have recognized that the inventor was in possession of the invention as claimed in view of the specification as filed. MPEP § 2163.04 (I). Here, the Examiner has done nothing but make a conclusory statement that the claims lack written description; no reasons or explanations have been provided. Moreover, as explained above, the limitations in question are indeed described in the specification at page 11, lines 10-14 and in originally-filed claim 9. Thus, Applicants respectfully submit that the Examiner's rejection is both legally insufficient and factually incorrect, and respectfully request withdrawal of the rejection.

#### Claim Objections

The Examiner objected to claims 18, 19-21 and 38 because of various informalities allegedly found in these claims. In claim 18, the Examiner alleges that the phrase "phase shift . . . introduced by a variation in a thickness of substrate or by use of a superimposed phase mask" is confusing and indefinite since the two alternative elements are recited in the alternating phase

and are not equivalent to each other. The Examiner alleges that “variation of the thickness of the substrate” is the structure of the grating for the phase shift, while the “phase mask” refers to the process of making the phase shift. Applicants submit that the Examiner’s objections are rendered moot by the cancellation of claim 18.

In claims 18 and 19, the Examiner alleges that the phrases “the complex-values spectral transfer function,” “the input optical field” and “the filtered optical field” are confusing and indefinite since each lacks proper antecedent basis from its base claim. Applicant submits that the Examiner’s objections are rendered moot by the cancellation of claims 18 and 19.

In claim 18, the Examiner alleges that the phrases “the complex-value spectral function,” the “a spatial Fourier transform of an *i*th sub-grating” are confusing and indefinite. The Examiner alleges that it is unclear what the complex-value spectral function is and what it relates to, and that it is unclear what defines or provides such function. The Examiner further alleges that the phrase “spatial Fourier transform of an *i*th sub-grating” is simply wrong since the Fourier transform is not about the sub-grating, because the sub-grating cannot be Fourier transformed. The Examiner’s rejections are rendered moot by the cancellation of claim 18.

In claim 18, the Examiner alleges that the mathematical expression is not well defined, since certain symbols in the expression are not defined. The Examiner’s rejections are rendered moot by the cancellation of claim 18. As to new claim 39, however, Applicants traverse the Examiner’s objection. There is no requirement that all terms found in a claim—mathematical or otherwise—be defined within the claim itself. In fact, all that is required is that the terms be defined somewhere in the application, whether in the claims themselves or in the specification. *See* MPEP § 608.01(o). Although not required to do so, Applicants have included in the claim definitions of all the terms in the mathematical expression. If there are any terms remaining in the expression that are not defined in the claim, Applicants respectfully direct the Examiner’s attention to the specification between page 11, line 22 and page 12, line 23, where all the variables in the mathematical expression are defined.

In claim 38, the Examiner alleges that the phrase “a Fourier spectrum of a reference waveform” is confusing and indefinite because, according to the Examiner, it is unclear what this phrase means. Applicants submit that the Examiner’s rejection is rendered moot by the cancellation of claim 38.

### Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 17, 19-20, 24-26, 27-28, 30, 36, 37, and 38 as anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 4,985,624 to Spillman Jr. ("Spillman"). As to claims 17, 19-20, 24-26, 27-28, 30, 36, 37, and 38, Applicants submit that the Examiner's rejections are rendered moot by the cancellation of these claims. As to new claim 39, however, Applicants respectfully traverse the Examiner's rejections. A claim is anticipated only if each and every element, as set forth in the claim, is found in a single prior-art reference. MPEP § 2131; *Verdegaal Bros. v. Union Oil of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). As explained below, Spillman cannot anticipate these claims because it does not disclose every element and limitation recited therein.

Claim 39 recites an apparatus including a plurality of sub-gratings, each sub-grating having a pair of lateral edges and a periodic array of diffraction elements, wherein the sub-gratings are positioned laterally adjacent to each other and wherein each sub-grating has an amplitude, a spatial phase shift, a spatial period, and an optical phase shift ( $A_i, x_i, \Lambda_i, \phi_i$ , respectively) introduced by a variation in a thickness of the substrate or by use of a superimposed phase mask, and wherein amplitude and phase parameters of each sub-grating are determined according to the equation

$$a_i = \beta d \int_{m/(\beta\Lambda_i) - 1/(2\beta d)}^{m/(\beta\Lambda_i) + 1/(2\beta d)} \frac{T(v)}{F_i(v)} \exp(-j\pi(v\beta - m/\Lambda_i)(x_i^a + x_i^b)) dv$$

The Examiner conceded that Spillman does not disclose a combination including the recited mathematical expression, and therefore Spillman cannot anticipate claim 39. Applicants therefore respectfully submit that claim 39 is allowable and respectfully request allowance of the claim.

Regarding claims 40-47, if an independent claim is allowable, then any claim depending therefrom is also allowable. MPEP § 2143.03; *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). As discussed above, claim 39 is allowable. Applicant therefore respectfully submits that claims 40-47 are allowable by virtue of their dependence on an allowable independent claim, as well as by virtue of the features recited therein. Applicant therefore respectfully requests withdrawal of the rejections and allowance of these claims.

### Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 18, 21, 22-23, 29 and 31-35 under 35 U.S.C. § 103(a) as obvious in view of, and therefore unpatentable over, various combinations of the following references: Spillman, U.S. Patent No. 5,832,148 to Yariv ("Yariv") and U.S. Patent No. 5,703,907 to Jalali et al ("Jalali").

As to claims 18, 21, 22-23, 29 and 31-35, Applicants submit that the Examiner's rejections are rendered moot by the cancellation of these claims. As to new claim 39, however, Applicants respectfully traverse the Examiner's rejections. To establish a *prima facie* case of obviousness, three criteria must be met: (1) the prior art references must teach or suggest all the claim limitations; (2) some suggestion or motivation to combine the references must be found in the prior art; and (3) there must be a reasonable expectation of success. MPEP § 2143. As explained below, the Examiner has not established a *prima facie* case of obviousness.

The recitations found in claim 39 are discussed above. The Examiner concedes that Spillman does not explicitly disclose the recited mathematical expression, but alleges that inherent properties of Spillman would make the recited mathematical expression obvious to one of skill in the art. To rely on a theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the prior art. MPEP § 2112. This the Examiner has not done. Instead, the Examiner has merely made conclusory statements regarding inherent properties of Spillman, without any reasoned showing under MPEP § 2112 that such properties necessarily flow from the prior art. For this reason, Applicants submit that the Examiner's rejection is legally insufficient and respectfully request withdrawal of the rejection and allowance of the claim.

Regarding claims 40-47, if an independent claim is non-obvious under 35 U.S.C. § 103, then any claim depending therefrom is also non-obvious. MPEP § 2143.03; *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988). As discussed above, claim 39 is allowable. Applicant therefore respectfully submits that claims 40-47 are allowable by virtue of their dependence on an allowable independent claim, as well as by virtue of the features recited therein. Applicant therefore respectfully requests withdrawal of the rejections and allowance of these claims.

### Double Patenting Rejection

The Examiner rejected claims 17-38 under the judicially-created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 of U.S. Patent No. 6,314,220. According to the Examiner, although the conflicting claims are not identical they are not patentably distinct from each other because both claim a diffractive structure having a plurality of sub-gratings.

As to claims 17-38, Applicants submit that the Examiner's rejection is rendered moot by the cancellation of the claims. As to new claims 39-47, Applicants respectfully traverse the Examiner's rejection. Any obviousness-type double patenting rejection should make clear: (A) the differences between the inventions defined by the conflicting claims—a claim in the patent compared to a claim in the application; and (B) the reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim in issue is an obvious variation of the invention in a claim in the patent. MPEP §804(II)(B)(1). Here the Examiner has provided only a conclusory statement that the claims would be obvious in view of each other because they allegedly "claim a diffractive structure having a plurality of sub-gratings." The Examiner has provided no analysis of the difference between claims, nor an explanation of the reasons why one of ordinary skill in the art would consider such differences to be obvious variations. Applicant submits that the Examiner's rejection is therefore legally insufficient and respectfully requests withdrawal of the rejection.

### Conclusion

Given the above amendments and accompanying remarks, all claims pending in the application are in condition for allowance. If the undersigned attorney has overlooked a teaching in any of the cited references that is relevant to allowance of the claims, the Examiner is requested to specifically point out where such teaching may be found. Further, if there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (206) 292-8600.

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Respectfully submitted,

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Date: 2-25-04

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